

Schedule

Week 1 (09/07-9/11)

- Day 1
 - Introduction to Theory of Computation¹
 - Introduction to OCAML²
 - Assignment 1³
- Day 2
 - OCAML basics⁴
- Day 3
 - OCAML basics (cont)⁵
- Day 4
 - Basic set notions⁶
 - OCAML example: sets as lists⁷

Week 2 (09/14-09/18)

- Day 1
 - Functions and relations, predicates
 - Proof examples
- Day 2
 - Alphabets, strings, substrings, empty string
 - Lexicographic ordering
- Day 3
 - Languages, examples
 - Union, Intersection, Star
 - OCAML: How to represent languages? (lazy evaluation perhaps?)
- Day 4
 - Deterministic Finite Automata
 - DFAs in OCAML

¹notes/theory_intro.html

²notes/ocaml_intro.html

³<assignments/1.html>

⁴notes/ocaml_basics.html

⁵notes/ocaml_basics.html

⁶<notes/sets.html>

⁷notes/ocaml_sets.html

Week 3 (09/21-09/25)

- Day 1
 - Language accepted by automaton / Regular Languages
 - Examples from OCAML language
- Day 2
 - Union of regular languages is regular
 - Implement in OCAML
- Day 3
 - Non-deterministic automata, examples
 - Implementation in OCAML
- Day 4
 - DFA equivalent to an NFA
 - Union / Intersection / Star of regular languages is regular

Week 4 (09/28-10/02)

- Day 1
 - Regular Expressions
 - OCAML implementations
 - RegEx -> NFA
- Day 2
 - Nonregular languages
 - Pumping Lemma
 - Examples
- Day 3
 - Catching up
- Day 4
 - Midterm 1

Week 5 (10/05-10/09)

- Day 1
 - Context Free Grammars
 - Examples of derivations
- Day 2

- Programming examples of CFGs
 - Ambiguous grammars
- Day 3
 - Chomsky Normal Forms
- Day 4
 - PushDown Automata definition

Week 6 (10/12-10/16)

- Day 1
 - PDAs more examples
 - OCAML implementation
- Day 2
 - CFG \rightarrow PDA
- Day 3
 - PDA \rightarrow CFG
- Day 4
 - Non-context-free grammars
 - Pumping lemma for CFGs

Week 7 (10/19-10/23)

- Day 1
 - Fall Break
- Day 2
 - Brief intro to parsers
- Day 3
 - More on parsers?
- Day 4
 - Turing Machines

Week 8 (10/26-10/30)

- Day 1
 - Turing Recognizable vs Turing Decidable languages
- Day 2
 - Multitape / Nondeterministic Turing machines
- Day 3
 - The Church-Turing thesis, algorithms
- Day 4
 - Decidable Problems, for regular languages

Week 9 (11/02-11/06)

- Day 1
 - The Halting Problem
- Day 2
 - Undecidability of Halting Problem
- Day 3
 - Catching up
- Day 4
 - Midterm 2

Week 10 (11/09-11/13)

- Day 1
 - Reducibility
- Day 2
 - Regularity of languages is undecidable
- Day 3
 - Time Complexity classes
- Day 4
 - The class P

Week 11 (11/16-11/20)

- Day 1
 - The class NP
- Day 2
 - P vs NP, NP-complete problems
- Day 3
- Day 4

Week 12 (11/23-11/27)

- Day 1
- Day 2
 - Thanksgiving Break
- Day 3
 - Thanksgiving Break
- Day 4
 - Thanksgiving Break

Week 13 (12/01-12/04)

- Day 1
- Day 2
- Day 3
- Day 4

Week 14 (12/07-12/11)

- Day 1
- Day 2
- Day 3
- Day 4